



AN ANALYSIS OF CHINA'S POVERTY RESEARCH BASED ON CITESPACE

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ABSTRACT

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This paper uses CiteSpace to comprehensively grasp the situation of poverty research through the keyword co-occurrence and cluster by extracting the literature information in China during 1998-2017. The results show that the literature on poverty in China has different kinds of hotspots, which changed from rural areas, poverty alleviation and economic growth to multidimensional poverty, industrial poverty alleviation, and precise poverty alleviation. The researches mostly focus on subjects of poverty, poverty alleviation, sustainable development, and so on. This paper also finds that the number of research is huge, but the targeted research and field research is not enough. In the future, deep research on precise poverty alleviation will become a new trend.

JEL Classification:

C88; I30.

Contribution/Originality: The paper contributes the first analysis of the hotspots and frontiers of poverty research in China with the information visualization tool - CiteSpace. And this study has summarized the trends of research content and research paradigm based on the analysis.

1. INTRODUCTION

Since the reform and opening-up, China's economy has experienced rapid growth. At the same time, China's poverty situation has also undergone tremendous changes. In 1978, under the poverty line of 100 yuan, the rural poor population reached 250 million, and the incidence of poverty was 30.7%. As of the end of 2017, there were still 30.46 million poor people (the poverty line is 2300 yuan, 2011 constant price). The incidence of poverty is 3.1%. Obviously, the rapid economic growth can reduce the number of absolute poor people. However, many studies have shown that the poverty problem in China is still serious. The rapid economic growth has not only brought huge social wealth, but also intensified the gap between income inequality and regional development imbalance. Some people still stay in poverty because of combined factors such as ability, geographical location or ethnic distribution. Under the failure to get rid of poverty, these groups are the focus of the current poverty alleviation stage. The government has continued to maintain poverty alleviation, and has also put forward the requirement of "precise poverty alleviation" in the new situations. 2020 is the target year for China to build a well-off society in an all-round way. This means poor people will all achieve poverty alleviation. Scholars try to use in-depth research from the

perspectives of poverty, measurement, formation, and countermeasures. Future poverty reduction measures will pay more attention to the “individualization” of poverty problems faced by different regions and groups.

There are a large number of domestic and foreign literatures on poverty research. However, China's poverty problem is significantly different from other countries or regions. Due to the different stages in economic development and social structure in each period, poverty in China shows different characteristics, and the government's poverty alleviation policy is also adjusted in time. Therefore, studying the domestic literature, combing the hotspots and trends in poverty research in the past 20 years will help us more clearly grasp the research path of poverty in China, and provide a theoretical basis. It has certain guiding significance.

2. DATA AND METHODS

The data in this paper comes from China National Knowledge Infrastructure (CNKI), which could provide domestic academic literature, dissertations, reference books and other resources. Using CNKI database can more accurately reflect the current research status of poverty in China. After choosing “economics and management science” category, setting time span with “1998 to 2017”, and setting search theme with “poverty” or “poverty alleviation”, 6551 articles were selected. Excluding the irrelevant contents that did not conform to the research topic and finally 5709 articles were obtained.

The information visualization tool used is CiteSpace, which is jointly developed by Dr. Chen Chaomei, an information visualization expert from the School of Information Science and Technology of Drexel University, and WISE Lab of Dalian University of Technology. It is one of the most popular knowledge mapping tools. Its main function is to identify and display new trends and developments in the scientific literature. “The history of the evolution of a domain of knowledge is concentrated on a citation network map, and the citations of the citations are used as the basis of knowledge. The research fronts characterized by co-citation clustering are automatically expressed” (Chen *et al.*, 2015). In 2005, the scientific knowledge map first appeared in the domestic literature. In the past decade, the attitude of Chinese researchers to CiteSpace and knowledge map has evolved from initial fanaticism to rational analysis, objective evaluation and scientific use. With the in-depth understanding of this scientific research method, the scientific knowledge map has played an important role in exploring research hotspots, cutting-edge frontiers, and research directions. In CNKI database, there are 2,342 academic papers (2005~2017) related to “CiteSpace” or “Scientific Knowledge Atlas” (including journals, papers, domestic and foreign conferences, etc.). The number of publications about it is obviously increasing these years (Chen *et al.*, 2009; Chen *et al.*, 2015). Therefore, using CiteSpace to analyze domestic poverty research can quickly and comprehensively grasp the hotspots and frontiers through the functions of keyword co-occurrence and clustering, bringing reference value for future research.

3. ANALYSIS OF THE STATUS OF POVERTY RESEARCH

This section uses CiteSpace to obtain the keyword co-occurrence and clustering by extracting the literature information. Based on the result, the content and the trend of the research paradigm can be summarized. The parameter values should be set before running the data. Table 1 shows the details.

Table-1. Parameter settings

Settings	Value	Description
Publication Years	1998-2017	Time zone is divided into 1 year
Threshold	Top50	Select the top 50 high frequency nodes in each time zone
Pruning	Pathfinder	Simplify the network and highlight its important structural features
Type of key words	Term phrase	Extract from the title and abstract
Types of nodes	Terms and key words	Get a higher clustering module

The upper left corner of the visualization map generated by CiteSpace displays information which contains threshold settings, number of nodes, number of connections, network density, contour values, and module values. Table 2 shows the details. Based on the network structure and the clarity of clustering, CiteSpace provides two indicators: module value and average contour value, which can be used as the basis for judging the mapping effect. The module value reflects the modularity of the network and the mean silhouette is used to measure the network homogeneity (Chen *et al.*, 2015). It shows that the module degree (Q value) is 0.5819, and the mean silhouette is 0.5601, whereby it can be judged that the community structure shown by the map is significant, and the clustering can be considered to be reasonable.

Table-2. Parameter description

Parameter	Description
Version	V.5.1.R5 SE(64-bit)
Network N=545, E=1360 (density=0.0092)	Number of network nodes: 545, number of connections: 1360, network density: 0.0092
Modularity $Q=0.5819$	The network module value is generally in the $[0,1)$ interval. If $Q>0.3$, it means that the separated community structure is significant.
Mean Silhouette=0.5601	When $S>0.7$, the clustering is significant. If $S>0.5$, the clustering is reasonable.

Data source: software running results

3.1. Key Words about Poverty

The key words are the core of the literature, and the high-frequency keywords appearing in the subject area are often regarded as hot research fields (Zhao and Xu, 2010). Co-word analysis is one of the basic functions of CiteSpace. It can be used to judge the relationship between the themes by analyzing the phenomena that the terminologies appear in the same literature. Then display the research structure of the discipline. Therefore, the extraction of keywords can help us understand the current research focus and hotspots. Based on the frequency and year of occurrence of the keyword, the research hotspot and its appearance and duration can be known. The times of the hotspots' occurrence reflects how the research focus changed.

Table-3. Keyword co-occurrence frequency

No.	Keyword	Frequency	Year	No.	Keyword	Frequency	Year
1	Poverty	736	1998	16	Poverty Reduction	121	2005
2	Precise Poverty Alleviation	491	2014	17	Sustainable Development	120	2000
3	Anti-poverty	368	1998	18	Urban Poverty	120	2000
4	Poverty Alleviation and Development	285	2001	19	Multidimensional Poverty	113	2011
5	Poverty Areas	249	2000	20	Rural Poor	110	2000
6	Economic Growth	205	2001	21	Farmer	109	2007
7	Ethnic Area	202	1998	22	Human Capital	106	2002
8	Poverty Alleviation	201	1998	23	Poverty Alleviation Policy	105	1998
9	Rural Poverty	183	2003	24	Income Distribution	97	1998
10	Tourism Poverty Alleviation	147	1998	25	Influencing Factor	94	2005
11	Rural	142	2000	26	Social Capital	79	2005
12	Economic Development	139	1998	27	Industrial Poverty Alleviation	78	2012
13	Poverty Alleviation Work	136	1998	28	Microfinance	74	2001
14	Poverty Alleviation Funding	131	1998	29	Relative Poverty	74	1998
15	Countermeasures	129	2000	30	Development-oriented Poverty Alleviation	71	2000

Data source: software running results

Table 3 clearly lists the top 30 keywords of the co-occurrence frequency. It shows:

- (1) The slowdown in the incidence of poverty in China mainly depends on policy support. Especially in overall poverty, the western minority areas and the vast rural areas are the key targets for poverty alleviation.
- (2) When choosing the path of poverty reduction, scholars are more inclined to explore the effects of sustainable poverty reduction (such as tourism poverty alleviation).
- (3) The research scope of poverty will be expanded with the changes of government policies and characteristics of poverty. This trend can be seen by the appearance of the keywords, such as industrial poverty alleviation, development-oriented poverty alleviation, or precision poverty alleviation.

3.2. Keyword Clustering on Poverty

The role of co-words is to extract high-frequency keywords to help users quickly and comprehensively understand the hotspots and evolution of research content, by using log likelihood ratio algorithm (LLR) to automatically identify each cluster (Chen *et al.*, 2015). The log likelihood algorithm determines the maximum likelihood based on the probability density function to find the most likely word. Compared with the keyword co-occurrence map, cluster is more focused on reflecting the structural features, highlighting key points and important connections between clusters. The location of the node tags in each cluster reflects its core level, and other nodes constitute a research subject with the core nodes. Because the keyword clustering map is automatically generated by the software, it is displayed in Chinese. In order to show the results more clearly, the author transfers the clustering map to Table 4.

Table-4. Keywords clusters

Cluster	Cluster label words	Cluster	Cluster label words
#0	Poverty	#8	Income distribution
#1	Poverty alleviation target	#9	Microfinance
#2	Poverty area	#10	Regional development
#3	Poverty reduction	#11	Multidimensional
#4	Inclusive growth	#12	Poverty alleviation policy
#5	Poverty household	#13	Credit policy
#6	Labor flow	#15	Poverty alleviation sector
#7	National-level poverty county	#16	Continuous development strategy

Data source: software running results. The number of cluster is automatically generated by software.

There are 11 clusters in Table 4, representing 11 research hotspots in poverty research. In order to clearly show the specific clustering situation, the label words in Table 5 are corresponded to each cluster in Table 4. The tag words identified by the LLR algorithm in each cluster in Table 5 are displayed in high-to-low order. Among these words in each cluster, the top-ranked tag word with larger LLR represents this cluster. The degree of clustering (Silhouette) is used to measure the homogeneity within the cluster. The closer to 1, the higher the homogeneity, but the reliability of this value will decrease if there are few members in the cluster.

Table-5. Cluster Results

Cluster	Silhouette	Average year	LLR label words
#0	0.677	2007	Poverty; anti-poverty; precise poverty alleviation; ethnic areas; rural areas; tourism poverty alleviation; microfinance; countermeasures; well-off society; influencing factors; poverty line; status quo; government-led; linear expenditure system; enlightenment; rural minimum living security
#1	0.612	2003	Poverty Alleviation; Absolutely Poor Population; Developmental Poverty Alleviation; Poverty Alleviation Fund; National Poverty Counties; Rural Poverty Population; Rural Poverty Alleviation and Development; Poverty Alleviation Model; Absolute Poverty; Economic Development; Poverty Alleviation Criteria; Farmers' Per Capita Net Income; Anti-Poverty Strategy
#2	0.713	2005	Poverty-stricken areas; sustainable development; western development; new rural construction; government; urbanization; sustainable poverty alleviation model; ecological environment; agricultural structure; return to poverty; industrial restructuring; returning farmland to forests and grassland; tourism development; new countryside
#3	0.643	2007	Poverty; financial development; threshold effect; economic growth; non-equilibrium effect; panel data; human capital; county economy; inclusive finance; urban-rural income gap; poverty alleviation; poverty alleviation; poverty trap; policy recommendations; Qinghai
#4	0.778	2006	Inclusive growth; poverty alleviation and development; equity; the gap between rich and poor; social exclusion; social security; rural poverty; rural subsistence allowance; rights poverty; employment; poverty alleviation projects; public expenditure; poverty growth elasticity; shared growth; wage; innovation
#5	0.754	2009	Poor farmers; poverty management; trade conditions; private lending; livelihood capital; concentrated contiguous areas; comparative advantage; reasons; landless farmers; sustainable livelihoods; national economy; cooperation mechanism; empowerment; demand; transformation path
#6	0.913	2008	Labor mobility; social equity impact effect; underemployment; ecological poverty; rural minimum living security system; cluster analysis; social assistance; geopolitical poverty; employment assistance; poverty alleviation; factor analysis; alienation; questionnaire
#7	0.786	2005	National poverty-stricken counties; resource advantages; post-catch-up; poverty alleviation plan; industrial poverty alleviation; middle income; poverty alleviation and development strategy; socialist superiority; research report; income difference; Tibet peaceful liberation; remote and poverty-stricken areas; main economic indicators
#8	0.863	2003	Income distribution; anti-poverty path; regional public goods; collaborative supply; unemployed population; China's economic transformation; means of protection; market distribution; socio-economic status; population calculation; underdeveloped areas; income redistribution; contiguous poverty; resource Integration
#9	0.82	2008	Quantile regression; poverty reduction effect; microfinance poverty alleviation; rural informal finance; poverty index; microfinance project; rural finance; rural formal finance; microfinance institution; impulse response function; public goods supply; Income inequality
#10	0.932	2000	Regional development; urban poverty; living standards; coastal cities; economic landslide; sunset industry; transportation hub cities; guiding investment; urban economy; regional economy; unfair distribution; urban poor population; human capital stock
#11	0.866	2011	Green development; ecological compensation; contiguous destitute areas; Wulingshan area; ecological protection; measurement; pro-poor; poverty identification; knowledge poverty; urbanization; migrant workers; poverty measurement; poverty decomposition; Xihaigu area; income poverty; healthy poverty
#12	0.893	2002	Resource allocation function; human development report; preferential policy; tax-sharing fiscal system; special transfer payment; income tax law; transfer payment system; economic development level; central finance; rural poverty alleviation; NGO; temporary poverty; poverty dynamics
#13	0.838	2001	Agricultural production; regional policy; agricultural development bank; national credit; agricultural policy finance; total labor force; farmers getting rid of poverty; sunshine project; labor transfer; project loan; utility maximization; rural labor force; poverty alleviation loan; loan guarantee
#15	0.994	1998	Discounted loans; grassroots institutions; loan recovery; management operation mechanism; agricultural issuance system; corporate loans; poverty alleviation loans; loan guarantees; strategic deployment; credit system; cadre achievements; agricultural management methods; loan recovery rate; project objectives
#16	0.991	2000	Gradient theory; external funds; non-renewable resources; urban population; agricultural and forestry products; regional development gap; mineral resources; agricultural surplus labor; urban economy; mountain economy; cadre training; investment dispersion; talent mobility; professional skill worker

Data source: software running results

On the basis of the automatic clustering identification, the label-words in the clusters can be comprehensively interpreted, and the frontiers of poverty research can be summarized:

(1) Poverty subject

#1Poverty alleviation target, #2Poverty area, #5Poverty household, #7National-level poverty county, #10Regional development, these five clusters mainly study the main body of poverty problem. Poor people in western region, national-level poverty county, concentrated contiguous poverty zone, and remote poverty areas are the key targets. Researchers put more attention on them because they are the key points to solve poverty problem in China. From the central government to the local government, they have allotted a large amount of financial funds to these subjects. At the same time, urban poverty has also received attention due to the context of regional coordinated development.

(2) Poverty reduction initiatives

It contains: #0Poverty, #3Poverty reduction, #4Inclusive growth, #6Labor flow, #8Income distribution, #12Poverty alleviation policy, #16Continuous development strategy. These clusters explore the path of poverty reduction. From the perspective of policy, there are implementation of policies, usage of funds, implementation of projects, and adjustment of income redistribution. From the perspective of market economy, there are solving the employment problems of the poor, improving industrial structure, and utilizing external investment.

(3) Poverty and finance

It contains: #9Microfinance, #13 Credit policy, and #15Poverty alleviation sector. These clusters are all related to finance, but the focus is different. In the early days, it relied mainly on the government's grassroots institutions' loans to change the agricultural management methods. With the deep research on rural poverty, and the promotion of inclusive finance, the range of financial poverty alleviation has been expanding and the methods have been diversifying. Microfinance poverty alleviation plays a certain role. The number of papers on microfinance has increased significantly according to the needs of policy, focusing on the target, usage and advantages.

(4) New trends:

Cluster #11Multidimensional poverty appeared in 2011, the definition of poverty changed from single dimension to multidimensional measurement. People have a new understanding of poverty, and have formed a more stereoscopic theoretical framework in the causes of poverty and poverty alleviation measures. In 2011, China's rural poverty alleviation and development program (2011-2020) was introduced. It had referred that China's poverty is characterized by diversification and complexity. Obviously, defining poverty by income or consumption expenditure cannot truly reflect the current poverty situation in China. Poverty involves many aspects including health, housing, and opportunities of getting knowledge and job, or even the feeling of happiness. Scholars have begun to pay attention to some new contents, such as green development, ecological compensation, knowledge poverty, health poverty, or the decomposition of poverty.

4. ANALYSIS OF THE TRENDS OF RESEARCH CONTENTS AND PARADIGMS

Through the research hotspots and research frontiers of poverty, the changes in the content and paradigms of poverty research in China during the past 20 years can be summarized.

4.1. Trends in Research Content

With the development of social economy and adjustment of economic structure, the focus, research methods and research contents of literatures in each period have obviously changed:

(1) From focusing on rural poverty to urban poverty

Although urban poverty cannot be ignored, the rural poverty is still the focus. And the main problem of poverty is the old and poor (Wan and Zhang, 2008; Yuan *et al.*, 2009; Li and Bai, 2010). With the conversion of space and time, the performance of poverty is also different (Luo, 2010; Zhang, 2010) so it is the first principle to adapt to local conditions when proposing poverty reduction measures.

(2) From the concept of “economic growth can reduce poverty” to “economic growth may not be pro-poor”

Before 2002, the poverty research field mostly affirmed the poverty alleviation effect of economic growth. And data showing that during this period no matter what the absolute poverty line was, China's rural poverty was significantly declining (Xia *et al.*, 2010). In the subsequent studies, domestic scholars put forward the idea of "poverty reduction flexibility" (Wen, 2006) reduction of poverty alleviation quality and speed (Hu *et al.*, 2007) and decomposing effects on the basis of affirming the role of economic growth in poverty alleviation. And use relevant data to show that in different regions effects of economic growth on poverty alleviation are different (Li *et al.*, 2010; Wang and Hu, 2014). Scholars' research on poverty is developing in a scientifically rigorous and comprehensive direction, because of diverse methods and frequent academic exchanges at home and abroad.

(3) From focusing on the overall poverty situation to analysis of the reasons of poverty

At early time, research simply focused on per capita income. Now the education of women and children, the nutritional health of poor areas, the capacity of rural self-development, the vulnerability of poverty, and the intergenerational transmission of poverty have become the focus points. Some scholars also divide poverty into temporary poverty and chronic poverty, and discuss the measurement, decomposition and decisive factors of the two (Zhang *et al.*, 2013). However, it must be mentioned that most articles still focus on economic growth, per capita income or income gap (Wan and Zhang, 2006; Lin and Zhang, 2012; Zhang, 2013) which may be related to the availability of data and the quantification of analysis.

(4) From one-dimensional poverty measure to multidimensional poverty dynamic measurement

In the process of studying poverty, the measurement of poverty belongs to basic research, so the methods and models for measuring poverty gradually improve as the research progresses. The Human Poverty Index (HPI) proposed by the United Nations Development Programme (UNDP) in the Human Development Report in 1997 consists of three indicators: life expectancy, literacy and living standards. This index indicates that people are beginning to realize the necessity of multidimensional measurement (Zhang and Chen, 2006). Before 2007, domestic scholars generally used one or two methods to measure poverty. Most of these methods use the single dimension of income level to portray poverty. With the increasing international academic exchanges and the continuous improvement of major literature databases, more and more scholars have realized that a single measurement method cannot effectively reflect the actual situation.

Domestic research on multidimensional poverty is later than foreign scholars. Foreign research on multidimensional poverty measurement began in 1984 (Foster *et al.*, 1984). In 2007, Amartya Sen, the founder of the multidimensional poverty theory, founded the Oxford Center for Poverty and Human Development, which is dedicated to the study of multidimensional poverty. Then Wang Xiaolin used the 2006 China Health and Nutrition Survey data to measure the multidimensional poverty of urban and rural families in China (Wang and Sabina, 2009) which was the earliest domestic literature on using multidimensional measurement model to measure poverty. In 2011, Alkire and Foster used the double-critical value method to identify the poor and improved the multidimensional measurement model. After that, domestic scholars generally used multidimensional measurement methods to measure poverty (Zou and Fang, 2011; Zou and Fang, 2012).

4.2. Research Paradigm Classification

Domestic literature research paradigm on poverty can be roughly divided into three categories:

(1) A qualitative analysis of the existing poverty situation

On the basis of grasping the current poverty alleviation policies and the characteristics of the research objects in this period, scholars describe the poverty situation and the trend of change, and use this as a basis for proposing solutions to poverty problems. The subjects generally are typical poverty areas, such as economically underdeveloped areas or ethnic minority areas. Taking Guizhou as an example, scholars analyze the economic and social status quo with the characteristics of karst landforms, ethnic minorities, human-land conflicts, and poor ecological environment, and propose targeted poverty-reduction ideas, such as attaching importance to education,

cultivating tourism, advantageous industries, continued implementation of preferential policies, sustainable development of ecological resources, etc (Yang *et al.*, 2002; Peng, 2003; Li and Wang, 2006)

(2) Descriptive analysis of data

Such literature starts with data from a certain period or a specific region. Most of the data is derived from a relatively authoritative database, and then the rules or problems are found in the analysis results. For example, Hu *et al.* (2006) used the panel data of statistical yearbooks and statistical summaries to observe the changes in the wage income of rural residents, the number of people moving to cities and towns, the purchase price index of agricultural products, and the proportion of national poverty alleviation funds, thus obtaining China's poverty characteristics and poverty reduction trends from the 1978 to 2004. Then use descriptive data to clarify the important reasons for the slowdown in China's poverty reduction since the 1990s, and make effective recommendations for the next step of anti-poverty (Hu *et al.*, 2006).

This kind of literature clarifies all aspects of poverty based on economic data. The content of the article is easy to understand. While without deep mining of data, the views mentioned in the discussion of the causes, status quo and solutions of poverty are not targeted enough.

(3) Use the econometric model, indicators or coefficients to construct the model

The author needs to be familiar enough with the indicators, coefficients, and quantitative methods used in the article. When analyzing the situation of poverty, the author may find the connection between the indicators and actually construct the model to obtain persuasive research results. For example, Wang and Hu (2014) article refers to the method proposed by Besley and Burgess (2003) and Loayza and Raddatz (2010) using the fixed effect model to estimate the impact of growth of different industries on poverty alleviation, and studying the relationship between labor intensity and industrial development's poverty alleviation effect by adding control variables (Besley and Burgess, 2003; Loayza and Raddatz, 2010; Wang and Hu, 2014). Luo (2012) used the micro households database with Shapley decomposition principle to estimates the economic growth effect and income distribution effect of poverty change in different years.

Articles generally use two or more types of indices, methods or models to process data. The credibility, completeness or continuity of the data largely determines the research results. Otherwise, the choice of control variables, methods and models need to be consistent with the research object.

5. CONCLUSIONS

An overview of the main literatures in poverty research can outline the research priorities, including income levels, income distribution, poverty measurement, poverty standards, and the relationship between economic growth and poverty reduction, or other aspects. At each historical stage, literatures would focus on the role of government policies in poverty alleviation, and thinking about what extent can these measures such as transfer payments, social welfare, do and trade openness alleviate poverty.

With the in-depth study of poverty issues and the changes in realities, research hotspots and research frontiers have also shifted. Most of the early articles focused on rural areas, poverty alleviation and development, and economic growth. After 2011, research topics such as multi-dimensional poverty, industrial poverty alleviation, and precision poverty alleviation have emerged. In this process, the understanding of the nature of poverty, the causes of poverty, and the path of poverty alleviation has changed widely.

Although the number of literature studies is huge, there are not enough researches on targeted research and field research. And it is found that there are not many articles studying the poverty-reducing ability of poverty subjects. In the future research, the specific path of poverty alleviation to the poor, that is, the deep exploration of precision poverty alleviation will become a new research trend.

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